

An archipelago within an archipelago: A checklist of liverworts and hornworts of Kepulauan Sunda Kecil (Lesser Sunda Islands), Indonesia and Timor-Leste (East Timor)

Ainun Nadhifah¹, Lars Söderström², Anders Hagborg³,
Eka Aditya Putri Iskandar¹, Ida Haerida⁴, Matt von Konrat³

1 Cibodas Botanic Garden, Research Center for Plant Conservation and Botanic Gardens, Indonesian Institute of Sciences (LIPI), West Java, Indonesia **2** Norwegian University of Science and Technology, Trondheim, Norway **3** The Field Museum, Chicago, USA **4** Herbarium Bogoriense, Research Center for Biology, Indonesian Institute of Sciences (LIPI), West Java, Indonesia

Corresponding author: Ainun Nadhifah (ainun.nadhifah@lipi.go.id)

Academic editor: Matt Renner | Received 11 March 2021 | Accepted 7 June 2021 | Published 3 August 2021

Citation: Nadhifah A, Söderström L, Hagborg A, Iskandar EAP, Haerida I, Konrat M (2021) An archipelago within an archipelago: A checklist of liverworts and hornworts of Kepulauan Sunda Kecil (Lesser Sunda Islands), Indonesia and Timor-Leste (East Timor). *PhytoKeys* 180: 1–30. <https://doi.org/10.3897/phytokeys.180.65836>

Abstract

The first ever liverwort and hornwort checklist is provided for the Kepulauan Sunda Kecil (Lesser Sunda Islands) of Indonesia and Timor-Leste (East Timor). We report 129 accepted taxa, 12 doubtful taxa and three rejected taxa previously reported for the Lesser Sunda Islands. The list is based on over 130 literature references, including monographs, regional studies, and molecular investigations. It is clear that bryophytes from this region have been overlooked historically, and under collected, compared to seed plants, birds, and other organisms, forming a remarkable gap in the flora of Indonesia. Publications dealing with liverworts of Lesser Sunda Islands are few and scattered. We predict that further fieldwork, in addition to collections unveiled from regional herbaria, will uncover a number of new records that remain to be reported, especially considering that regionally widespread species have been recorded elsewhere.

Keywords

Checklist, hornworts, Indonesia, Kepulauan Nusa Tenggara, Kepulauan Sunda Kecil, Lesser Sunda Islands, liverworts, Timor-Leste (East Timor)

Introduction

The Lesser Sunda Islands (**LSI**), known in Indonesia as Kepulauan Sunda Kecil, are an area covering a longitudinal distance of some 600 kilometres in the southeastern portion of Indonesia, extending between Java in the west and New Guinea in the east (Fig. 1). Lesser Sunda Islands include a multitude of islands, the major ones of which are Flores, Sumba, Sumbawa, and Timor. The region overlaps with two different countries; Indonesia, which includes four different provinces, i.e., Bali, West Nusa Tenggara, East Nusa Tenggara (including Western part of Timor island), and part of Moluccas (van Steenis-Kruseman and van Steenis 1950; Monk et al. 1997; Jepson and Whitaker 2002) and Timor-Leste (East Timor), which includes the eastern part of Timor island (Kusuma 2017). The Lesser Sunda Islands occur as two geologically distinct island chains termed the Inner and Outer Banda Arcs (Audley-Charles 2011). This archipelago also occurs at the heart of the complex crossroads of two continents, Asia and Australia, and two oceans, the Indian and Pacific (Monk et al. 1997). The Lesser Sunda Islands may act as ‘stepping stones’ for animals and plants dispersing between the Greater Sunda Shelf, i.e., the Malay Peninsula, Borneo, Sumatra, Java, and Bali, and the Sahul Shelf, i.e., New Guinea, Australia, and their land-bridge islands (Reilly 2016). Bordered to the west by the Greater Sunda Shelf and to the east by the Sahul Shelf, the Lesser Sunda Islands can be considered oceanic islands in the sense that they have never been connected by land to continental Asia or continental Australo-Papua.

The island chain of LSI comprises 5.2% of endemic species based on families treated in Flora Malesiana (van Welzen et al. 2005). Interestingly, the Indonesian part contains the highest percentages of endemic plants of Indonesia, i.e., 55% (Bappenas 2016). Some important and better-known endemic species in this ecoregion are the Komodo dragon (*Varanus komodoensis*), the largest lizard in the world and the iconic

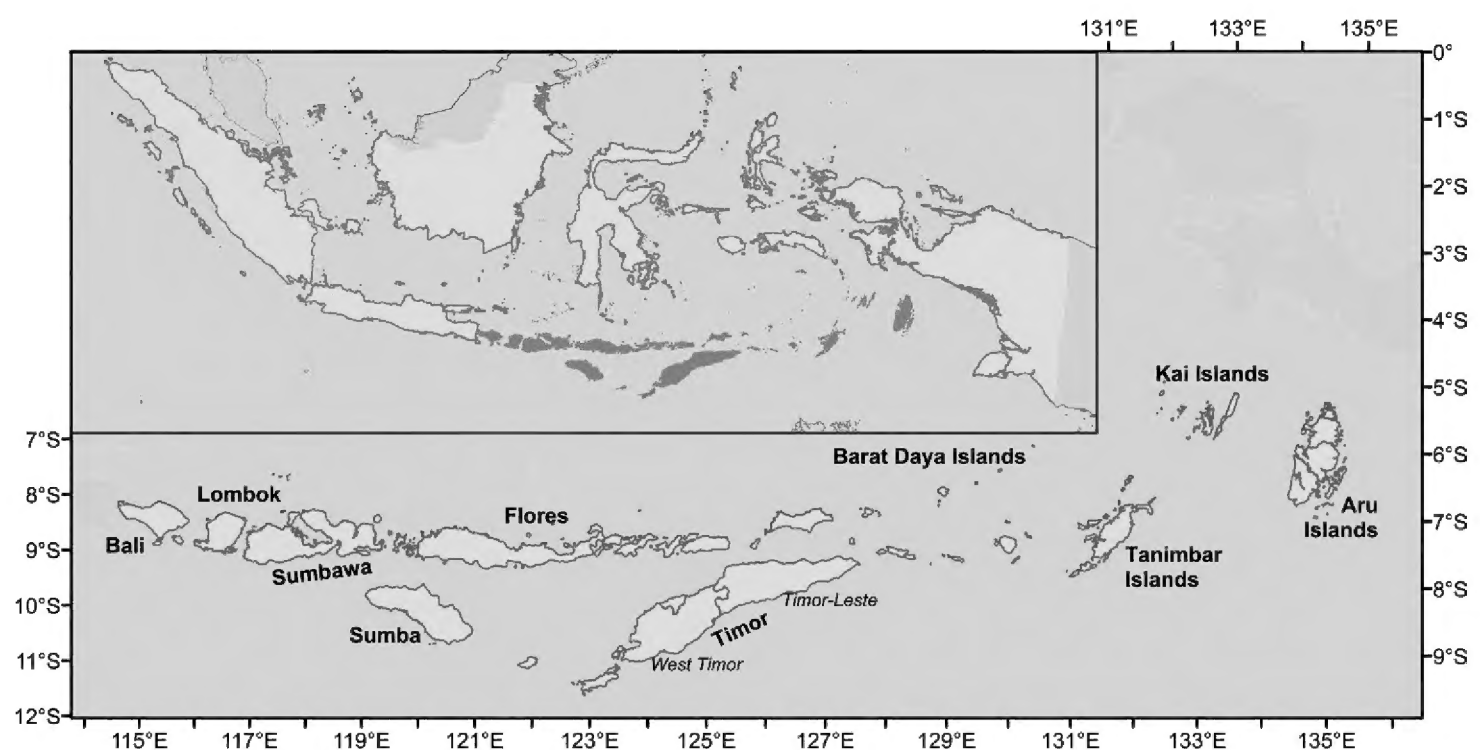


Figure 1. Map of Lesser Sunda Islands with an inset of Indonesia.

tree of East Nusa Tenggara Province, sandalwood tree (*Santalum album* L.), and *Dracaena multiflora* Warb. ex Sarasin (Monk et al. 1997).

The islands of LSI include seven ecoregions in two biomes, Tropical and Subtropical Moist Forests and Tropical and Subtropical Dry Forests (Fig. 2; Terrestrial Ecoregions of the World; Olson et al. 2001). The “Tropical and Subtropical Moist forest” includes two ecoregions on Bali, and two ecoregions on the eastern islands. The Eastern Java-Bali rainforest (<https://www.worldwildlife.org/ecoregions/im0113>) and Eastern Java-Bali Montane Rain Forest (<https://www.worldwildlife.org/ecoregions/im0112>) are situated on the Sunda shelf and both are classified as endangered ecoregions since a lot of forest has been cleared. It forms transitional vegetation types relative to the drier areas of the central islands situated on the Sahul shelf.

The “Tropical and Subtropical Dry forests” consist of three ecoregions from Lombok in the west to Timor and Wetar in the east. All three ecoregions are critically endangered/endangered. The largest of the ecoregions is “Lesser Sunda Deciduous Forests” (<https://www.worldwildlife.org/ecoregions/aa0201>) on Lombok, Sumbawa, Flores and west to Alor including smaller surrounding islands. It consists mainly of semi-evergreen dry forests. With an average annual rainfall of 1,349 mm, this is the driest area but also the most seasonal in Indonesia (Touw 1992). The “Sumba Deciduous Forest” (<https://www.worldwildlife.org/ecoregions/aa0203>) was also dominated by deciduous monsoon forest, but now much of it has been replaced by savanna and grasslands (Monk et al. 1997). The “Timor and Wetar Deciduous Forest” (<https://www.worldwildlife.org/ecoregions/aa0204>) is also largely deforested and replaced by grasslands and savanna.

Further east, two more ecoregions of “Tropical and Subtropical Moist Deciduous Forests” occur. The “Banda Sea Islands Moist Deciduous Forest” (<https://www.worldwildlife.org/ecoregions/aa0102>) includes all islands west of Timor/Wetar, except Aru Island. It includes evergreen rain forest (Kepulauan Kai), semi-evergreen rain forest, moist deciduous forest, and dry deciduous forest (Monk et al. 1997). The forests are still largely intact, but the ecoregion is still classified as vulnerable. The “Vogelkop-Aru Lowland

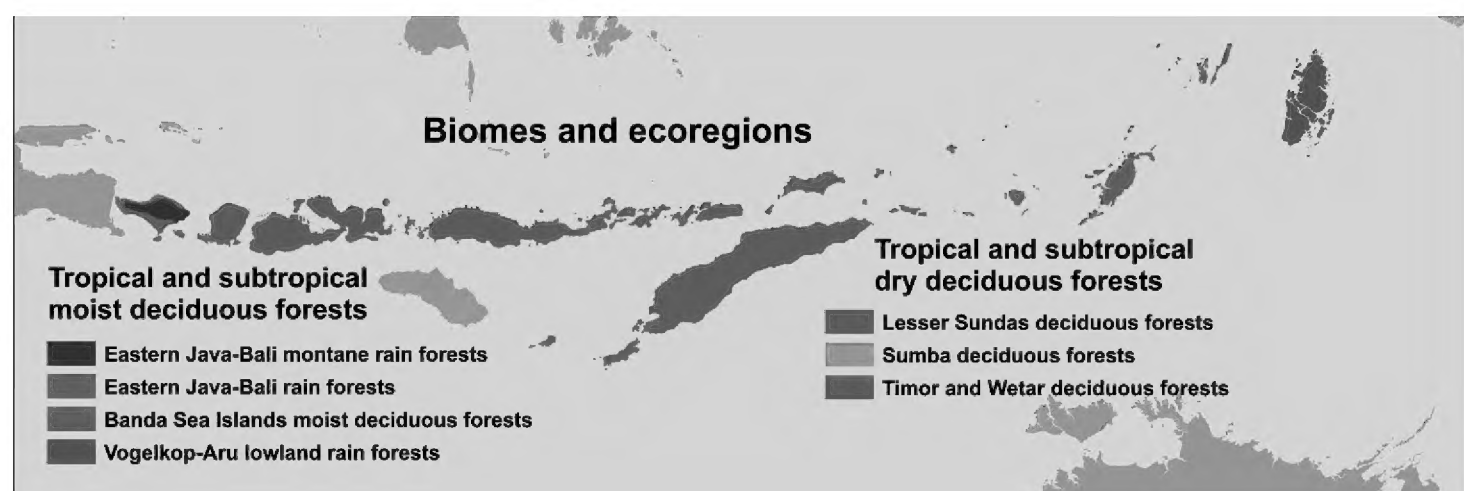


Figure 2. Seven ecoregions in two biomes of Lesser Sunda Islands following the Terrestrial Ecoregions of the World.

Rain Forest” (<https://www.worldwildlife.org/ecoregions/im0128>) is mostly confined to New Guinea but occurs also on Aru. Large parts of the ecoregion are still intact.

Bryophytes, including mosses, liverworts and hornworts, are the second largest group of land plants after flowering plants and are pivotal in our understanding of early land plant evolution (e.g., Ligrone et al. 2012; Zhang et al. 2020). Bryophytes play a significant ecological role including CO₂ exchange (De Lucia et al. 2003), plant succession (Cremer and Mount 1965), production and phytomass (Frahm 1990), nutrient cycling (Coxson 1992) and water retention (Pócs 1980; Gradstein et al. 2001). Retnowati et al. (2019) cited 849 species of liverworts, 28 species of hornworts and 1,884 species of mosses which are scattered in the major islands of Indonesia. As with many regions in the world, it is evident that the bryophyte, especially the liverwort flora, remains very poorly known in comparison to the vascular flora. Gradstein and Culmsee (2010) noted there are few studies from Southeast Asia investigating the diversity and ecology of tropical bryophytes.

It is clear that bryophytes from this region have been overlooked historically, and under-collected, compared to seed plants, birds, and other organisms, forming a remarkable gap in the flora of Indonesia and/or Timor-Leste. Publications dealing with liverworts of LSI also are few and scattered. The first apparent report of liverworts from LSI was by Sande Lacoste (1856) in the mid-19th century. It was not until the late 19th century and early 20th century that further influential works appeared, including those by Schiffner (1898, 1900, 1955), Stephani (1886, 1899, 1907, 1908, 1909, 1911, 1917, 1924), Verdoorn (1930, 1934a, 1934b, 1935, 1937), and others. Among those islands, Bali is the most explored island (Hegewald and van Zanten 1986; Eggers et al. 1998; Schäfer-Verwimp 2006, 2009; Haerida et al. 2010; Alam 2012; Heinrichs et al. 2012; Girmansyah et al. 2013) with 101 species accepted here. Söderström and Sénéca (2008) reported only 61 number of liverworts for Lesser Sunda Islands and considered that this low number of species was the effect of the under-explored areas. More recently, little botanical work has been done in the area; the area has occasionally been visited by students and researchers from nearby institutions, but publications are still lacking. This checklist will complement the survey of mosses of Lesser Sunda Islands by Touw (1992) who enumerated 367 species for the area, and complement other checklists of liverworts from Indonesia, including Java (Söderström et al. 2010), Bali (Haerida 2015, 2017) as well as Sumba (Haerida et al. 2020).

We here present the first-ever checklist of liverworts and hornworts for the Lesser Sunda Islands to serve as the baseline information in our study of the liverworts diversity of this archipelago. Furthermore, this checklist can serve to promote and encourage bryological research in the region. The significance of checklists is summarized by Söderström et al. (2008), including outlining the utility of checklists as powerful and important tools, and their applicability to taxonomy, systematics, and conservation.

As with many other regions in the world, given the relatively poor focus on liverworts in LSI historically, we predict that a vast number of new records are yet to



Figure 3. Number of known species from the individual islands. The darker the color, the greater the number of species.

be reported for the area. In this checklist we report 129 taxa, with another 12 taxa questioned and three rejected. The number of known species from individual islands varies from 101 (Bali) to 0 (Barat Daya Islands), but only Bali has more than 20 known species (Fig. 3).

Materials and methods

Nomenclature and taxonomy follows the world checklist of hornworts and liverworts (Söderström et al. 2016) with a few updates from recent taxonomic literature. Sources include over 130 publications found through the work of Early Land Plants Today (**ELPT**) database of liverwort taxonomy and distribution, and with some consultation with taxonomic experts. The checklist follows a similar format of previous liverwort and hornwort checklists by the authors, e.g., Java (Söderström et al. 2010). The checklist distinguishes between records that are based on specimens seen by the author(s) (reference in bold) and second-hand reports, e.g., citations of earlier publications (reference in normal type). All names used for the references are given after the taxon name with spelling variants/errors within quotation marks. Taxa are arranged in alphabetical order. Significantly, each accepted taxon is qualified using a four level ranking system that indicates our level of knowledge about a taxon. The coding convention is outlined in detail by von Konrat et al. (2010). Briefly, ? = Problem with the taxon name; * = Serious doubts about the value of the taxon; ** = Probably a good taxon (default value); *** = Accepted, a good taxon as currently understood.

This checklist covers the Lesser Sunda Islands based on reports from the literature that have been subdivided into 10 geographical units that correspond to geopolitical units. These include from west to east (Fig. 1) Bali, Lombok, Sumbawa, Sumba, Flores, Timor (separated in the Indonesian West Timor and the independent Timor-Leste), Barat Daya Islands, Tanimbar Islands, Kai Islands and Aru Islands.

Types from Lesser Sunda Islands

Recently, there has been some debate whether the type information by Bonner (1962, 1963, 1965), as well as the other volumes of his “Index Hepaticarum”, can be accepted as lectotypes. Renner (2021) argued in favour for the volumes of Bonner (1962, 1963, 1965), including recommendations to improve typification practice, and Engel and Merrill (2019) argued that Bonner’s herbarium designations do not represent lectotypifications. Here we accept the typifications made by Bonner as they pertain to the taxa treated here, but we also provide alternative typifications if ruled against. In the latter cases, we instead “validate” Bonner’s typifications, yet causing no nomenclatural changes whichever view is taken.

It is not always clear if more than one collection exists for a possible type. McNeill (2014) recommends that in such a case a lectotype should be selected from known available material, but with a statement that it may be the only material, in which case a lectotypification would be superfluous. For such cases, we here follow McNeill’s “best practice” advice using the suggested phrase “lectotype here designated, if not a holotype”.

Anastrophyllum integerrimum Steph., Sp. Hepat. (Stephani) 6: 107, 1917 (Stephani 1917). Originally described from “Java (Koorders leg), Lombock. (Elbert legit.)”. Lectotype (Bonner 1962): Java, 5000 pd., Koorders s.n. ex hb. Schinz, Zürich, G-00067196 (<http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=118174&lang=en>). Specimen also annotated as “holotype” by J. Váňa in 1974. Note: If Bonner’s typification is rejected, we here designate the specimen as a new lectotype. The species was synonymized with *Gottscheia schizopleura* by Grolle (1968).

Chiloscyphus communis Steph., Bull. Herb. Boissier (sér. 2) 7 (10): 839 [=Sp. Hepat. (Stephani) 3: 211], 1907 (Stephani 1907). Originally described from “Java, Sumatra, Celebes, Nova Guinea, Timor, Samoa, Andaman Insulae, Queensland, Assam, Sikkim, Japan, valde communis.”. Lectotype (Bonner 1963): Andamans, Port Blair, VIII.1890, E.H. Man, ex hb. Levier, G-00115054 (<http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=165692&lang=en>). Specimen annotated as isotype by H. Inoue (undated). There are many specimens in G that Stephani may have seen, but apparently only this specimen corresponds to Bonner’s typification. The species was synonymized with *Chiloscyphus bescherellei* (= *Heteroscyphus coalitus*) by Hattori (1966).

Drepanolejeunea moluccensis Herzog, Ann. Bryol. 7: 88, 1934 (Herzog 1934). Originally described from “Molukken: Batjan, G. Sibella (Herb. H. B. Bog. n. 4103, leg. Roepke); Bali: Bratansee (Renner n. 331 ♀ u. ♂)”. Lectotype (here designated): Molukken, Batjan, G. Sibela, 1600–2000 m, W.K.J. Roepke s.n., JE-04002975 (<https://herbarium.univie.ac.at/database/detail.php?ID=120304>). Herzog noted “typus” on the specimen from Batjan while he noted “cotypus” on the specimen from Bali. The Bali material is issued in the exsiccatae “Hepaticae Selectae et Criticae (ed. Fr. Verdoorn) Ser. VIII (1965) 365” as “materia originalis” and should be present in several herbaria.

Fimbraria latifrons Steph., Sp. Hepat. (Stephani) 6: 15, 1917 (Stephani 1917). Originally described from “Lombock. (Sunda Archipelagus.) (Elbert legit.)”. Lectotype

(Long 2006: 227): [Indonesia] Lombok, Rindjani-Vulkangebirge, NNO Seite, Andjar Fluss, oberhalb; Monsun Hochwald, 1400–1530 m, humus Sand, 19.5.1909, J. Elbert 1388 (G-15225). Isolectotype: FH). [=G-00113144, <http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=144318&lang=en>]. The species was synonymized with *Reboulia hemisphaerica* by Long (2006).

Frullania longispica Steph., Sp. Hepat. (Stephani) 4: 454, 1911 (Stephani 1911). Originally described from “Insula Timor”. Type (Bonner 1965): Timor, 1100 m, IX 1897, Francis Newton s.n., G. However, there are two specimens in G with those collection data, G barcode 00069224 and 00265585. The former is annotated by Verdoorn in 1928 as “typica, species auton. non est!” (<http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=114964&lang=en>), the latter does not have any annotation. Verdoorn never published any typification of *Frullania longispica* but G00069224 is apparently the base for the synonymization with *Frullania squarrosa* in Verdoorn (1930) and is here designated as lectotype.

Lepidozia newtonii Steph., Sp. Hepat. (Stephani) 3: 623, 1909 (Stephani 1909). Originally described from “Insula Timor (Newton)”. Lectotype (here designated, if not holotype): Timor, 1100 m, Sept 1897, Francis Newton, Steph. herb. no. 126, G barcode 00069698 (<http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=135054&lang=en>). There seems to be only one specimen in G that may be designated type, but we have not searched other herbaria and thus do not know if there are any possible type material elsewhere.

Madotheca elbertii Steph., Sp. Hepat. (Stephani) 6: 520, 1924 (Stephani 1924). Originally described from “India orientalis: Lombock (Elbert legit)”. Lectotype (Hattori 1969): Lombock, leg. leg. Dr. Elbert 2016, type of *Madotheca elbertii*, in herb. G (G barcode no. 00043932, <http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=130660&lang=en>). The species was synonymized with *Porella acutifolia* var. *lancifolia* (= var. *acutifolia*) by Hattori (1976).

Mastigobryum sumbavense Steph., Hedwigia 25 (6): 236, 1886 (Stephani 1886). Originally described from “Insula Sumbawa, ad 4000’, Zollinger No. 3400b (Herb. Gottsche)”. Lectotype (Mizutani 1967, ‘type’): Insula Sumbawa, Montis Batu, Alt. 4000 ft., Lante ad arbores, Zollinger 3400b, Steph. herb. no. 10769, G barcode 00066907. If Mizutani’s type specification is rejected we here designate the mentioned specimen as new lectotype (if it is not a holotype).

List of accepted species and infraspecific taxa

Anthocerotophyta

Folioceros

*** *Folioceros fuciformis* (Mont.) D.C.Bharadwaj **BALI: Schiffner 1955** as *Aspiromitus falsinervius*.

Marchantiophyta

Acanthocoleus

- *** *Acanthocoleus javanicus* (Steph.) Kruijt. **BALI: Wilson et al. 2007; Heinrichs et al. 2012; Dong et al. 2013; Haerida 2017.**

Acrolejeunea

- *** *Acrolejeunea aulacophora* (Mont.) Steph. **LESSER SUNDA IS.: BALI: Hegewald and van Zanten 1986; Haerida 2017.**
- *** *Acrolejeunea fertilis* (Reinw., Blume et Nees) Schiffn. **BALI: Gradstein 1975; Wilson et al. 2004; Forrest et al. 2006; Wilson et al. 2007; Heinrichs et al. 2012; Czumay et al. 2013; Dong et al. 2013; Heinrichs et al. 2014a; Heinrichs et al. 2014b; Schäfer-Verwimp et al. 2014; Bechteler et al. 2016a; Bechteler et al. 2016b; Haerida 2017. TANIMBAR ISLANDS: Gradstein 1975. TIMOR: Gradstein 1975.**

Aneura

- *** *Aneura maxima* (Schiffn.) Steph. **BALI: Haerida 2017.**
- *** *Aneura pinguis* (L.) Dumort. **BALI: Haerida et al. 2015; Haerida 2017.**

Asterella

- *** *Asterella blumeana* (Nees) Kachroo **LOMBOK: Long 2006.**
- *** *Asterella vulcanica* (Schiffn.) Kachroo et Bapna **BALI: Haerida et al. 2015; Haerida 2017.**

Bazzania

- *** *Bazzania longicaulis* (Sande Lac.) Schiffn. **SUMBA: Haerida et al. 2020.**
- * ¹ *Bazzania sumbavensis* (Gottsche ex Steph.) Steph. **SUMBAWA: LECTOTYPE of *Mastigobryum sumbavense*, Stephani 1886 as *Mastigobryum sumbavense*, Schiffner 1898; Stephani 1908 as *Mastigobryum sumbavense*, Bonner 1963; Grolle 1966; Mizutani 1967; Tixier 1974; Kamimura 1975; Miller et al. 1983; Miller et al. 1983 as *Mastigobryum sumbavense*, Geissler and Bischler 1985 as *Mastigobryum sumbavense*, Long and Grolle 1990; Sharma and Srivastava 1993; Bapna and Kachroo 2000.**

1 *Bazzania sumbavensis* is possibly conspecific with *Bazzania japonica* (Söderström et al. 2010).

Cheilolejeunea

- ** *Cheilolejeunea ceylanica* (Gottsche) R.M.Schust. et Kachroo **SUMBA: Haerida et al. 2020.**
- *** *Cheilolejeunea trapezia* (Nees) Kachroo et R.M.Schust. **BALI: Haerida 2017. SUMBA: Haerida et al. 2020.**

Chiastocaulon

- *** *Chiastocaulon dendroides* (Nees) Carl. **BALI: So 2001** as *Plagiochila dendroides*.
- *** *Chiastocaulon oppositum* (Reinw., Blume et Nees) S.D.F.Patzak, M.A.M.Renner, Schäf.-Verw. et Heinrichs. **LESSER SUNDA Is.: Pócs et al. 2011** as *Plagiochilion oppositum*. **BALI: Hegewald and van Zanten 1986** as *Plagiochilion oppositum*, **Groth and Heinrichs 2005** as *Plagiochilion oppositum*, Haerida et al. 2015 as *Plagiochilion oppositum*, **Patzak et al. 2016; Renner et al. 2016;** Haerida 2017; **Renner et al. 2017.** **SUMBAWA: Sande Lacoste 1864** as *Plagiochila opposita*, **Schiffner 1898** as *Plagiochila opposita*, Miller et al. 1983 as *Plagiochilion oppositum*.

Cololejeunea

- *** *Cololejeunea angustiflora* (Steph.) Mizut. **BALI: Haerida 2017.**
- *** *Cololejeunea appressa* (A.Evans) Benedix. **BALI: Haerida 2017.**
- ** *Cololejeunea gottschei* (Steph.) Pandé, K.P.Srivast. et Ahmad **BALI: Haerida 2017.**
- *** *Cololejeunea macounii* (Spruce) A.Evans **BALI: Haerida 2017.**
- *** *Cololejeunea obliqua* (Nees et Mont.) Schiffn. **BALI: Benedix 1953** as *Cololejeunea nymannii*, Tixier 1962 as *Cololejeunea nymannii*, Tixier 1973 as *Cololejeunea nymannii*, Miller et al. 1983 as *Cololejeunea nymannii*.
- *** *Cololejeunea ocelloides* (Horik.) Mizut. **BALI: Tixier 1962** as *Cololejeunea leonidens* var. *saccata*.
- ** *Cololejeunea subfloccosa* Mizut. **BALI: Haerida 2017.**
- ** *Cololejeunea triapiculata* (Herzog) Tixier **BALI: Haerida 2017.**
- *** *Cololejeunea trichomanis* (Gottsche) Besch. **BALI: Haerida 2017** as *Cololejeunea goebelii*.

Colura

- ** ² *Colura leratii* (Steph.) Steph. **BALI: Eggers et al. 1998;** Haerida 2017. **FLORES: Jovet-Ast 1967** as *Colura apiculata*, Eggers et al. 1998.

2 *Colura leratii* was omitted in Söderström et al. (2016) as the basionym was erroneously considered invalid.

Diplasiolejeunea

- *** *Diplasiolejeunea cavifolia* Steph. **BALI: Schäfer-Verwimp 2006³; Haerida 2017; Siregar et al. 2020.**

Drepanolejeunea

- *** *Drepanolejeunea levicornua* Steph. **SUMBA: Haerida et al. 2020.**
 ** *Drepanolejeunea moluccensis* Herzog. **BALI: SYNTYPE, Herzog 1934; Verdoorn 1935; Tixier 1979.**
 *** *Drepanolejeunea pentadactyla* (Mont.) Steph. **BALI: Haerida 2017.**

Dumortiera

- *** *Dumortiera hirsuta* (Sw.) Nees **BALI: Haerida et al. 2015; Haerida 2017.**

Fossombronina

- *** *Fossombronina himalayensis* Kashyap. **BALI: Krayesky et al. 2005.**

Frullania

- ** *Frullania apiculata* (Reinw., Blume et Nees) Nees **SUMBA: Haerida et al. 2020.**
 *** *Frullania ericoides* (Nees) Mont. **BALI: Hegewald and van Zanten 1986; Haerida 2017. LOMBOK: Verdoorn 1934b as *Frullania squarrosa*. TIMOR: TYPE of *Frullania longispica*, Stephani 1911 as *Frullania longispica*, Bonner 1965 as *Frullania longispica*.**
 *** *Frullania gaudichaudii* (Nees et Mont.) Nees et Mont. **BALI: Haerida 2015; Haerida 2017.**
 *** *Frullania gracilis* (Reinw., Blume et Nees) Nees **BALI: Haerida 2015; Haerida 2017; Rosyanti et al. 2018.**
 ** *Frullania intermedia* (Reinw., Blume et Nees) Nees subsp. *intermedia*. **ARU ISLANDS: Hattori 1980.**
 *** *Frullania junghuhniana* Gottsche. **BALI: Haerida 2015; Haerida 2017.**
 *** *Frullania meyeniana* Lindenb. **BALI: Haerida 2015; Haerida 2017; Rosyanti et al. 2018.**

3 The collecting data for the report of *Diplasiolejeunea cavifolia* in Schäfer-Verwimp (2006) is “Nord-bali, Distr. Tabanan, Bedugul, Aufstieg im Nebelwald zum Gunung Catur am Bratansee, epiphyll an *Pandanus* sp.; 1260 m, 30. Mai 1995, leg. Schäfer-Verwimp & Verwimp, det. Schäfer-Verwimp (Hb Schäfer-Verwimp No. 16750)” (A. Schäfer-Verwimp in litt. 2021).

- ***⁴ *Frullania moniliata* (Reinw., Blume et Nees) Mont. **BALI: Haerida 2015; Haerida 2017. SUMBA: Haerida et al. 2020. SUMBAWA: Sande Lacoste 1856; Schiffner 1898; Verdoorn 1930 as *Frullania moniliata* subsp. *breviramea*, Hattori 1975 as *Frullania tamarisci* var. *breviramea*.**
- *** *Frullania nodulosa* (Reinw., Blume et Nees) Nees **ARU ISLANDS: Mitten 1885 as *Frullania secundiflora*, Schiffner 1898 as *Frullania secundiflora*. FLORES: Hattori 1975. KAI ISLANDS: Mitten 1885 as *Frullania secundiflora*, Schiffner 1898 as *Frullania secundiflora*, Miller et al. 1983. SUMBA: Verdoorn 1930; Haerida et al. 2020. SUMBAWA⁵: Hattori 1951; Swanson and Miller 1969; Miller et al. 1983. TANIMBAR ISLANDS: Hattori 1980 as *Frullania nodulosa* var. *nodulosa*. TIMOR: Hattori 1980 as *Frullania nodulosa* var. *nodulosa*.**
- *** *Frullania ornithocephala* (Reinw., Blume et Nees) Nees **BALI: Haerida 2015; Haerida 2017. LOMBOK: Verdoorn 1934b.**
- *** *Frullania rio-janeirensis* (Raddi) Ångstr. **BALI: Hegewald and van Zanten 1986; Enroth 1991 as *Frullania africana*, Haerida 2017.**
- *** *Frullania serrata* Gottsche **LOMBOK: Verdoorn 1934b.**
- *** *Frullania ternatensis* Gottsche **BALI: Haerida 2015; Haerida 2017.**
- ** — var. *non-appendiculata* S.Hatt. **BALI: Hegewald and van Zanten 1986.**
- *⁶ *Frullania tricarinata* Sande Lac. **BALI: Hegewald and van Zanten 1986 as *Frullania 'tricapinata'*, Haerida 2017; Winter and Schäfer-Verwimp 2020.**
- *** *Frullania trichodes* Mitt. **KAI ISLANDS: Verdoorn 1937 as *Frullania tenuicaulis*.**

Gottschelia

- *** *Gottschelia schizopleura* (Spruce) Grolle **LESSER SUNDA Is.: Vána and Piippo 1989b; Vána 1991b. LOMBOK: SYNTYPE of *Anastrophyllum integerrimum*, Stephani 1917 as *Anastrophyllum integerrimum*, Bonner 1962 as *Anastrophyllum integerrimum*, Grolle 1968; Miller et al. 1983 as *Anastrophyllum integerrimum*.**

Herbertus

- ** *Herbertus ceylanicus* (Steph.) Abeyw. **FLORES: Juslén 2006.**
- *** *Herbertus dicranus* (Gottsche, Lindenb. et Nees) Trevis. **BALI: Juslén 2006; Vána et al. 2014.**
- ** *Herbertus longispinus* J.B.Jack et Steph. **FLORES: Juslén 2006.**
- ** *Herbertus ramosus* (Steph.) H.A.Mill. **BALI: Hegewald and van Zanten 1986; Haerida 2017.**

4 *Frullania moniliata* is a species complex (Vilnet et al. 2014) in sect. *Thyopsiella*.

5 We do not know of any first hand report of *Frullania nodulosa* from Sumbawa.

6 *Frullania tricarinata* is possibly conspecific with *Frullania hypoleuca* (Söderström et al. 2010).

- *** *Herbertus sendtneri* (Nees) Lindb. **LESSER SUNDA Is.: Juslén 2006** as *Herbertus armitanus*.

Heteroscyphus

- *** *Heteroscyphus argutus* (Reinw., Blume et Nees) Schiffn. **ARU ISLANDS: Mitten 1885** as *Chiloscyphus argutus*, **Schiffner 1898** as *Chiloscyphus argutus*. **BALI: Haerida et al. 2015; Haerida 2017.**
- *** *Heteroscyphus aselliformis* (Reinw., Blume et Nees) Schiffn. **BALI: Haerida 2017.** **SUMBAWA: Zollinger 1855** as *Chiloscyphus aselliformis*, **Sande Lacoste 1856** as *Chiloscyphus aselliformis*, **Schiffner 1898** as *Chiloscyphus aselliformis*, Schiffner 1900 as *Chiloscyphus aselliformis*, Miller et al. 1983; Piippo 1985; Piippo 1989b; Yamada and Hayashi 2003.
- *** *Heteroscyphus coalitus* (Hook.) Schiffn. **BALI: Hegewald and van Zanten 1986** as *Chiloscyphus coalitus*, Srivastava and Srivastava 2002; Haerida et al. 2015; **Haerida 2017.** **SUMBA: Haerida et al. 2020.** **TIMOR: SYNTYPE** of *Chiloscyphus communis*, Stephani 1907 as *Chiloscyphus communis*, Hattori 1951 as *Heteroscyphus communis*, Miller 1968 as *Chiloscyphus communis*, Swanson and Miller 1969 as *Chiloscyphus communis*, Piippo 1993. **TIMOR-LESTE: Piippo 1985; Piippo 1989b.**
- *** *Heteroscyphus splendens* (Lehm. et Lindenb.) Grolle **SUMBA⁷: Miller et al. 1983** as *Heteroscyphus decurrens*. **SUMBAWA: Zollinger 1855** as *Chiloscyphus decurrens*, **Sande Lacoste 1856** as *Chiloscyphus decurrens*, **Schiffner 1898** as *Chiloscyphus decurrens*, Pócs 1971 as *Heteroscyphus decurrens*.

Jackiella

- *** *Jackiella javanica* Schiffn. **BALI: Haerida 2017.**

Lejeunea

- *** *Lejeunea alata* Gottsche **SUMBA: Haerida et al. 2020.**
- *** *Lejeunea apiculata* Sande Lac. **BALI: Haerida 2017.**
- *** *Lejeunea mimula* Hürl. **BALI: Wilson et al. 2004; Gradstein et al. 2006; Wilson et al. 2007; Heinrichs et al. 2012; Czumay et al. 2013; Dong et al. 2013; Heinrichs et al. 2014a; Heinrichs et al. 2014b; Haerida 2017.**

Lepidozia

- * *Lepidozia newtonii* Steph. **TIMOR: TYPE, Stephani 1909.**

⁷ We do not know of any first hand report of *Heteroscyphus splendens* from Sumba. It may be an error for Sumbawa.

Leptolejeunea

- *** *Leptolejeunea elliptica* (Lehm. et Lindenb.) Besch. SUMBA: **Haerida et al. 2020.**
- *** *Leptolejeunea epiphylla* (Mitt.) Steph. BALI: **Haerida 2017.**
- ** *Leptolejeunea foliicola* Steph. BALI: **Eggers et al. 1998; Bechteler et al. 2016c; Haerida 2017; Shu and Zhu 2019.**
- * *Leptolejeunea massartiana* Schiffn. ex Herzog BALI: **Eggers et al. 1998; Haerida 2017.**
- *** *Leptolejeunea subacuta* Steph. ex A.Evans BALI: **Haerida 2017.**

Lopholejeunea

- *** *Lopholejeunea eulopha* (Taylor) Schiffn. BALI: **Zhu and Gradstein 2005; Haerida et al. 2010; Haerida 2017; Siregar et al. 2020.**
- *** *Lopholejeunea horticola* Schiffn. BALI: **Zhu and Gradstein 2005; Haerida et al. 2010; Siregar et al. 2014; Siregar 2015; Pócs and Chantanaorrapint 2016; Haerida 2017.**
- *** *Lopholejeunea nigricans* (Lindenb.) Schiffn. BALI: **Haerida 2017. SUMBA: Haerida et al. 2020.**
- *** *Lopholejeunea recurvata* Mizut. BALI: **Zhu and Gradstein 2005; Haerida et al. 2010; Haerida 2017.**
- *** *Lopholejeunea subfusca* (Nees) Schiffn. LESSER SUNDA IS.: Pócs et al. 1967. ARU ISLANDS: **Mitten 1885** as *Lejeunea subfusca*, **Schiffner 1898** as *Lopholejeunea sagrana* var. *subfusca*. BALI: **Zhu and Gradstein 2005; Haerida 2009; Haerida et al. 2010; Siregar et al. 2014; Siregar 2015; Haerida 2017; Rosyanti et al. 2018; Siregar et al. 2020.**
- *** *Lopholejeunea zollingeri* (Steph.) Schiffn. BALI: **Haerida 2017.**

Marchantia

- *** *Marchantia acaulis* Steph. BALI: **Haerida et al. 2015; Haerida 2017.**
- *** *Marchantia emarginata* Reinw., Blume et Nees BALI: **Siregar et al. 2013; Haerida et al. 2015; Siregar 2015; Haerida 2017; Ginting and Batubara 2019.**
- *** — subsp. *emarginata*. BALI: **Bischler-Causse 1989; Bischler and Piippo 1991. FLORES: Bischler-Causse 1989; Bischler and Piippo 1991.**
- *** *Marchantia geminata* Reinw., Blume et Nees BALI: **Haerida et al. 2015; Haerida 2017. FLORES: Bischler-Causse 1989.**
- *** *Marchantia treubii* Schiffn. LESSER SUNDA IS.: **Siregar et al. 2013; Siregar 2015. BALI: Haerida 2017. FLORES: Bischler-Causse 1989. LOMBOK: Bischler-Causse 1989. TIMOR: Stephani 1899; Bischler-Causse 1989.**

Metalejeunea

- *** *Metalejeunea cucullata* (Reinw., Blume et Nees) Grolle BALI: **Bechteler et al. 2016b.**

Metzgeria

- *** *Metzgeria ciliata* Raddi **BALI: Haerida 2017.**
- *** *Metzgeria consanguinea* Schiffn. **SUMBA: Haerida et al. 2020.**
- * *Metzgeria foliicola* Schiffn. **FLORES: So 2003b.**
- *** *Metzgeria lindbergii* Schiffn. **BALI: Haerida 2017. FLORES: So 2003b.**

Pallavicinia

- *** *Pallavicinia lyellii* (Hook.) Gray **BALI: Haerida 2017.**

Plagiochila

- *** *Plagiochila bantamensis* (Reinw., Blume et Nees) Mont. **BALI: So 2001.**
- *** *Plagiochila frondescens* (Nees) Lindenb. **BALI: Inoue 1984; Piippo 1989a; Patzak et al. 2016; Renner et al. 2017.**
- *** *Plagiochila javanica* (Sw.) Nees et Mont. **BALI: Inoue 1984; Hegewald and van Zanten 1986; Piippo 1989a; Haerida 2017.**
- *** *Plagiochila junghuhniana* Sande Lac. **BALI: So 2001.**
- * ⁸ *Plagiochila kuhliana* Sande Lac. **BALI: Inoue 1984.**
- ** *Plagiochila massalongoana* Schiffn. **BALI: Inoue 1984.**
- *** *Plagiochila obtusa* Lindenb. **BALI: So 2001.**
- *** *Plagiochila parvifolia* Lindenb. **BALI: So 2001.**
- ** *Plagiochila propinqua* Sande Lac. **BALI: Inoue 1984; Inoue 1989; Piippo 1989a; Piippo and Tan 1992; Grolle and So 1999b.**
- *** *Plagiochila renitens* (Nees) Lindenb. **BALI: Inoue 1984; Inoue 1989; Piippo 1989a.**
- *** *Plagiochila salacensis* Gottsche **BALI: Carl 1931 as *Plagiochila jackii*, Hegewald and van Zanten 1986; Grolle and So 1999a; So 2001; Siregar 2015; Haerida 2017; Siregar et al. 2018.**
- *** *Plagiochila sciophila* Nees **BALI: Inoue 1984; Inoue 1989; Piippo 1989a; Enroth 1991; Siregar 2015; Siregar et al. 2018.**
- ** *Plagiochila semidecurrens* (Lehm. et Lindenb.) Lindenb. **BALI: So 2001.**
- ** *Plagiochila spathulifolia* Mitt. **BALI: Inoue 1984; Inoue 1989.**
- *** *Plagiochila teysmannii* Sande Lac. **BALI: Hegewald and van Zanten 1986; So and Grolle 1999; Haerida 2017. SUMBA: Haerida et al. 2020.**

Pleurozia

- *** *Pleurozia gigantea* (F. Weber) Lindb. **FLORES: Thiers 1993.**

⁸ *Plagiochila kuhliana* is possibly conspecific with *Plagiochila sciophila* (Söderström et al. 2010).

Porella

- ** *Porella acutifolia* (Lehm. et Lindenb.) Trevis. **BALI: Hegewald and van Zanten 1986; Haerida 2017. LOMBOK: Miller et al. 1983.**
- ** — var. *acutifolia*. **LOMBOK: LECTOTYPE of *Madotheca elbertii*, Stephani 1924 as *Madotheca elbertii*, Hattori 1969 as *Porella acutifolia* var. *elbertii*.**

Ptychanthus

- *** *Ptychanthus striatus* (Lehm. et Lindenb.) Nees **BALI: Haerida 2017. LOMBOK: Verdoorn 1934a; Miller et al. 1983. SUMBA: Haerida et al. 2020.**

Radula

- ** *Radula acuminata* Steph. **BALI: Haerida 2017.**
- *** *Radula campanigera* Mont. **BALI: Haerida 2017.**
- ** *Radula javanica* Gottsche **BALI: Haerida 2017. SUMBA: Haerida et al. 2020.**
- * *Radula multiflora* Gottsche ex Schiffn. **ARU ISLANDS: Schiffner 1898. BALI: Hegewald and van Zanten 1986; Haerida 2017.**
- * *Radula pinnulata* Mitt. **ARU ISLANDS: Mitten 1885; Schiffner 1898.**
- *** *Radula ventricosa* Steph. **BALI: Haerida 2017.**

Reboulia

- *** *Reboulia hemisphaerica* (L.) Raddi **BALI: Haerida et al. 2015; Haerida 2017. LOMBOK: LECTOTYPE of *Fimbraria latifrons*, Stephani 1917 as '*Fimbriaria*' *latifrons*. Bonner 1965 as '*Fimbriaria*' *latifrons*, Long 2006.**

Riccardia

- ** *Riccardia crenulata* Schiffn. **BALI: Schiffner 1955 as *Riccardia tenuicostata*. SUMBA: Haerida et al. 2020 as *Aneura crenulata*.**

Riccia

- *** *Riccia billardiarei* Mont. et Nees **BALI: Jovet-Ast 2000; Jovet-Ast 2003.**
- *** *Riccia cruciata* Kashyap. **BALI: Jovet-Ast 2003.**
- *** *Riccia discolor* Lehm. et Lindenb. **BALI: Jovet-Ast 2003.**
- *** *Riccia junghuhniana* Nees et Lindenb. **BALI: Jovet-Ast 2003; Haerida 2017.**
- *** *Riccia mangalorica* Ahmad ex Jovet-Ast **BALI: Jovet-Ast 2003 as *Riccia mangalorica*.**

Scapania

- *** *Scapania javanica* Gottsche **BALI: Blockeel et al. 2009; Haerida 2017.**

Schiffneriolejeunea

*** *Schiffneriolejeunea tumida* (Nees) Gradst. **BALI: Wilson et al. 2004.**

*** — var. *haskarlina* (Gottsche) Gradst. et Terken. **BALI: Wilson et al. 2007.**

Schistochila

*** *Schistochila aligera* (Nees et Blume) J.B.Jack et Steph. **BALI: So 2003a. FLORES: So 2003a.**

*** *Schistochila blumei* (Nees) Trevis. **BALI: So 2003a.**

Solenostoma

*** *Solenostoma tetragonum* (Lindenb.) R.M.Schust. ex Váňa et D.G.Long **BALI: Váňa 1972, 1973, 1975, 1991a** all as *Jungermannia tetragona*, Miller et al. 1983 as *Jungermannia tetragona*, Váňa and Piippo 1989a as *Jungermannia tetragona*, Bapna and Kachroo 2000 as *Jungermannia tetragona*, Srivastava and Sharma 2000 as *Jungermannia tetragona*, Easa 2003 as *Jungermannia tetragona*.

*** *Solenostoma truncatum* (Nees) R.M.Schust. ex Váňa et D.G.Long **BALI: Váňa and Piippo 1989a** as *Jungermannia truncata*, Váňa 1991a as *Jungermannia truncata*, Bapna and Kachroo 2000 as *Jungermannia truncata*.

Spruceanthus

*** *Spruceanthus polymorphus* (Sande Lac.) Verd. **ARU ISLANDS: Mitten 1885** as *Phragmicoma polymorpha*, **Schiffner 1898** as *Thysananthus polymorphus*. **SUMBA: Haerida et al. 2020.**

*** *Spruceanthus semirepandus* (Nees) Verd. **LOMBOK: Verdoorn 1934a**; Jovet-Ast and Schmid 1958; Kitagawa 1981.

Thysananthus

*** *Thysananthus humilis* (Gottsche) Sukkharak et Gradst. **BALI: Sukkharak and Gradstein 2014** as *Mastigolejeunea humilis*. **SUMBA: Haerida et al. 2020** as *Mastigolejeunea humilis*.

*** *Thysananthus ligulatus* (Lehm. et Lindenb.) Sukkharak et Gradst. **SUMBA: Haerida et al. 2020** as *Mastigolejeunea ligulata*.

*** *Thysananthus spathulistipus* (Reinw., Blume et Nees) Lindenb. **BALI: Wilson et al. 2007; Haerida et al. 2010; Sukkharak 2011; Heinrichs et al. 2012; Czumay et al. 2013; Dong et al. 2013; Heinrichs et al. 2014a; Heinrichs et al. 2014b; Schäfer-Verwimp et al. 2014; Siregar et al. 2014; Siregar 2015; Sukkharak 2015; Bechteler et al. 2016a; Bechteler et al. 2016b; Haerida 2017; Siregar et al. 2017; Siregar et al. 2020. KAI ISLANDS: Verdoorn 1937. SUMBAWA:**

Zollinger 1855; Schiffner 1898; Verdoorn 1934a; Swanson and Miller 1969; Miller et al. 1983; Haerida et al. 2010; Siregar et al. 2014; Siregar 2015; Siregar et al. 2017.

*** *Thysananthus virens* Ångstr. **BALI: Sukkharak and Gradstein 2014b** as *Mastigolejeunea virens*, Siregar et al. 2020 as *Mastigolejeunea virens*.

Wiesnerella

*** *Wiesnerella denudata* (Mitt.) Steph. **BALI: Haerida 2017.**

Taxa of unclear affinity

A couple of taxa are published from Lesser Sunda Islands as varieties of species synonymized under other names, without transferring or synonymizing the variety. We have not been able to trace any specimen that they may be based on and, thus, not been able to refer them to any valid taxon.

Chiloscyphus

? *Chiloscyphus zollingeri* Gottsche var. *subintegerrimus* Schiffn. **BALI: Schiffner 1955.**

NOTE: *Chiloscyphus zollingeri* Gottsche is now *Heteroscyphus zollingeri* but we are not sure if var. *subintegerrimus* also belongs to that species and is worth recognizing.

Riccardia

? *Riccardia platyclada* Schiffn. var. *leiomitra* Schiffn. **BALI: Schiffner 1955.** NOTE:

Riccardia platyclada Schiffn. is a synonym of *R. graeffei* but it is unclear where var. *leiomitra* from Java belongs (Söderström et al. 2010).

Taxa reported but doubtfully occurring in Lesser Sunda Islands

Marchantiophyta

Bazzania

** *Bazzania ceylanica* (Mitt.) Steph. **LESSER SUNDA IS.: Miller et al. 1983.** NOTE: The report by Miller et al. is unclear and it may be that they meant some of the Greater Sunda Islands. It is widespread in SE Asia, so its presence is not unlikely.

*** *Bazzania erosa* (Reinw., Blume et Nees) Trevis. **LESSER SUNDA IS.: Miller et al. 1983.** NOTE: The report by Miller et al. is unclear and it may be that they meant some of the Greater Sunda Islands. It is widespread in SE Asia so its presence is not unlikely.

*** *Bazzania tridens* (Reinw., Blume et Nees) Trevis. **LESSER SUNDA IS.: Miller et al. 1983. SUMBAWA: Pócs 1971.** NOTE: We are not aware of any first hand report from

Lesser Sunda Islands but it is common in SE Asia so its presence on some of the islands is not unlikely.

Ceratolejeunea

- *** *Ceratolejeunea* cf. *papuliflora* Steph. **SUMBA**: Haerida et al. 2020. NOTE: The species was only reported with doubt. It is otherwise not reported outside Africa, but it occurs on the Western Indian Ocean Islands and may perhaps also occur in SE Asia.

Cololejeunea

- *** *Cololejeunea* cf. *lanciloba* Steph. **BALI**: Haerida 2017. NOTE: The species was only reported with doubt. However, it is widespread in SE Asia and its occurrence in the area is not unlikely.
- ** *Cololejeunea* cf. *serrulata* Steph. **BALI**: Haerida 2017. NOTE: The species was only reported with doubt. It occurs on other Islands in SE Asia so its presence on the Lesser Sunda Islands is not unlikely.

Colura

- *** *Colura ari* (Steph.) Steph. **LESSER SUNDA IS.**: Miller et al. 1983. NOTE: The report by Miller et al. is unclear and it may be that they meant some of the Greater Sunda Islands. It is widespread in SE Asia so its presence is not unlikely.
- ** *Colura imperfecta* Steph. **LESSER SUNDA IS.**: Miller et al. 1983. NOTE: The report by Miller et al. is unclear and it may be that they meant some of the Greater Sunda Islands. It is widespread in SE Asia so its presence is not unlikely.

Conoscyphus

- *** *Conoscyphus trapezioides* (Sande Lac.) Schiffn. **LESSER SUNDA IS.**: Miller et al. 1983 as *Chiloscyphus trapezioides*. NOTE: The report by Miller et al. is unclear and it may be that they meant some of the Greater Sunda Islands. It is widespread in SE Asia so its presence is not unlikely.

Drepanolejeunea

- *** *Drepanolejeunea ternatensis* (Gottsche) Schiffn. **LESSER SUNDA IS.**: Miller et al. 1983. NOTE: The report by Miller et al. is unclear and it may be that they meant some of the Greater Sunda Islands. It is widespread in SE Asia so its presence is not unlikely.

Radula

- *** *Radula complanata* (L.) Dumort. **BALI**: Haerida 2017. NOTE: A mainly boreal species that have its closest known occurrences in Himalaya. The report was

erroneously published without a 'cf' as the identification was only preliminary (I. Haerida).

Targionia

*** *Targionia hypophylla* L. **BALI:** Haerida 2017. **NOTE:** The species was only reported with doubt. It is widespread but as the relation to other taxa remains unclear, its distribution is also unclear.

Taxa reported but rejected from Lesser Sunda Islands

Marchantiophyta

Ceratolejeunea

*** *Ceratolejeunea ceratantha* (Nees et Mont.) Schiffn. **SUMBAWA:** Sande Lacoste 1864 as *Lejeunea ceratantha*, **Schiffner 1898**. **NOTE:** This is a Neotropical taxon and the old reports from Asia must be rejected.

Frullania

* *Frullania ludoviciae* Steph. **SUMBAWA:** Miller et al. 1983 (with a '?'). **NOTE:** Hattori (1986) is rejecting earlier records outside New Caledonia as based on erroneous synonymization of *F. tenuirostris*.

Thysananthus

*** *Thysananthus auriculatus* (Wilson et Hook.) Sukkharak et Gradst. **BALI:** Wilson et al. 2004 as *Mastigolejeunea auriculata*, **Wilson et al. 2007** as *Mastigolejeunea auriculata*, **Ye and Zhu 2018**. **NOTE:** Sukkharak and Gradstein (2014) rejects all report of this American-African taxon from SE Asia as *Thysananthus humilis*.

Synonyms

Anastrophyllum integerrimum Steph. = *Gottschelia schizopleura*

Aneura crenulata (Schiffn.) Steph. ≡ *Riccardia crenulata*

Aspiromitus falsinervius (Lindenb. ex Meissner) Steph. = *Folioceros fuciformis*

Chiloscyphus argutus (Reinw., Blume et Nees) Nees ≡ *Heteroscyphus argutus*

Chiloscyphus aselliformis (Reinw., Blume et Nees) Nees ≡ *Heteroscyphus aselliformis*

Chiloscyphus coalitus (Hook.) Nees ≡ *Heteroscyphus coalitus*

Chiloscyphus communis Steph. = *Heteroscyphus coalitus*

Chiloscyphus decurrens (Reinw., Blume et Nees) Nees = *Heteroscyphus splendens*

Chiloscyphus trapezioides Sande Lac. ≡ *Conoscyphus trapezioides*

Cololejeunea goebelii (Gottsche ex Schiffn.) Schiffn. = *Cololejeunea trichomanis*

Cololejeunea leonidens var. *saccata* Benedix = *Cololejeunea ocelloides*
Cololejeunea nymannii (Steph.) Benedix = *Cololejeunea obliqua*
Colura apiculata Steph. = *Colura leratii*
Fimbraria latifrons Steph. = *Reboulia hemisphaerica*
Frullania africana Steph. = *Frullania rio-janeirensis*
Frullania longispica Steph. = *Frullania ericoides*
Frullania moniliata subsp. *breviramea* (Steph.) Verd. = *Frullania moniliata*
Frullania secundiflora Mont. = *Frullania nodulosa*
Frullania squarrosa (Mont.) Nees = *Frullania ericoides*
Frullania tamarisci var. *breviramea* (Steph.) S.Hatt. = *Frullania moniliata*
Frullania tenuicaulis Mitt. = *Frullania trichodes*
Herbertus armitanus (Steph.) H.A.Mill. = *Herbertus sendtneri*
Heteroscyphus communis (Steph.) Schiffn. = *Heteroscyphus coalitus*
Heteroscyphus decurrens (Nees) Schiffn. = *Heteroscyphus splendens*
Jungermannia tetragona Lindenb. \equiv *Solenostoma tetragonum*
Jungermannia truncata Nees \equiv *Solenostoma truncatum*
Lejeunea ceratantha Nees et Mont. \equiv *Ceratolejeunea ceratantha*
Lejeunea subfusca (Nees) Nees et Mont. \equiv *Lopholejeunea subfusca*
Lopholejeunea sagrana var. β *subfusca* (Nees) Schiffn. \equiv *Lopholejeunea subfusca*
Madotheca elbertii Steph. = *Porella acutifolia* var. *acutifolia*
Mastigobryum sumbavense Gottsche ex Steph. \equiv *Bazzania sumbavensis*
Mastigolejeunea auriculata (Wilson et Hook.) Steph. \equiv *Thysananthus auriculatus*
Mastigolejeunea humilis (Gottsche) Schiffn. \equiv *Thysananthus humilis*
Mastigolejeunea ligulata (Lehm. et Lindenb.) Schiffn. \equiv *Thysananthus ligulatus*
Mastigolejeunea virens (Ångstr.) Steph. \equiv *Thysananthus virens*
Phragmicoma polymorpha Sande Lac. \equiv *Spruceanthus polymorphus*
Plagiochila dendroides (Nees) Lindenb. \equiv *Chiastocaulon dendroides*
Plagiochila jackii Schiffn. nom. illeg. = *Plagiochila salacensis*
Plagiochila opposita (Reinw., Blume et Nees) Lindenb. \equiv *Chiastocaulon oppositum*
Plagiochilion oppositum (Reinw., Blume et Nees) S.Hatt. \equiv *Chiastocaulon oppositum*
Porella acutifolia var. *elbertii* (Steph.) S.Hatt. = *Porella acutifolia* var. *acutifolia*
Riccardia tenuicostata Schiffn. nom. illeg. = *Riccardia crenulata*
Riccardia tenuicostata Schiffn. = *Riccardia inconspicua*
Riccia mangalorica Ahmad nom. inval. \equiv *Riccia mangalorica*
Thysananthus polymorphus (Sande Lac.) Schiffn. \equiv *Spruceanthus polymorphus*

Acknowledgements

We would like to thank Research and Innovation in Science and Technology Project (RISET-Pro) - Ministry of Research and Technology/National Research and Innovation Agency of Indonesia for granting the scholarship to the first author, Cibodas Botanic Garden, Research Center for Plant Conservation and Botanic Gardens - LIPI for support, and Mr. Lukman Budiman from PDDI – LIPI for his kindly assistance in the BO library.

The Biodiversity Heritage Library is acknowledged for the facility they provide that has greatly accelerated our efforts. The generous support by the National Science Foundation (Award No.'s 1145898, 1146168, 1458300, 1541506, 2001509 and 0531730) is gratefully acknowledged. We also recognize the support of the Museum Collection Spending Fund, administered by Field Museum, as well as curatorial support provided by Y. Rodriguez, L. Kawasaki, and A. Balla (Field Museum). Alfons Schäfer-Verwimp kindly provided us with specimen data from his unpublished *Diplasiolejeunea cavifolia*. We are very grateful for the helpful suggestions and comments made by the editor and reviewers: Matt A. Renner, S.R. Gradstein, Li Zhang, and an anonymous reviewer.

References

- Alam A (2012) Liverwort Flora of Parson's valley Nilgiri hills (Western Ghats), South India. *Archive for Bryology* 119: 1–20.
- Audley-Charles MG (2011) Tectonic post-collision processes in Timor. *Geological Society of London, Special Publications* 355(1): 241–266. <https://doi.org/10.1144/SP355.12>
- Bapna KR, Kachroo P (2000) *Hepaticology in India – I*. Himanshu Publications, Udaipur, 439 pp.
- Bappenas [Kementerian Perencanaan Pembangunan Nasional/Badan Perencanaan Pembangunan Nasional/Indonesian Ministry of National Development Planning/ National Development Planning Board] (2016) *Indonesian Biodiversity Strategy and Action Plan (IBSAP) 2015–2020*. Jakarta.
- Bechteler J, Lee GE, Schäfer-Verwimp A, Renner MAM, Peralta DF, Heinrichs J (2016a) Towards a monophyletic classification of Lejeuneaceae V: The systematic position of *Pictolejeunea*. *Phytotaxa* 280(3): 259–270. <https://doi.org/10.11646/phytotaxa.280.3.4>
- Bechteler J, Lee GE, Schäfer-Verwimp A, Pócs T, Peralta DF, Renner MAM, Schneider H, Heinrichs J (2016b) Towards a monophyletic classification of Lejeuneaceae IV: Reinstatement of *Allorgella*, transfer of *Microlejeunea aphanella*. *Plant Systematics and Evolution* 302(2): 187–201. <https://doi.org/10.1007/s00606-015-1252-8>
- Bechteler J, Schäfer-Verwimp A, Lee GE, Feldberg K, Pérez-Escobar OA, Pócs T, Peralta DF, Renner MAM, Heinrichs J (2016c) Geographical structure, narrow species ranges, and Cenozoic diversification in a pantropical clade of epiphyllous leafy liverworts. *Ecology and Evolution* 7(2): 638–653. <https://doi.org/10.1002/ece3.2656>
- Benedix EH (1953) Indomalayische Cololejeuneen. *Feddes Repertorium Specierum Novarum Regni Vegetabilis* (Beiheft 134): 1–88.
- Bischler H, Piippo S (1991) Bryophyte flora of the Huon Peninsula, Papua New Guinea. L. *Marchantia* (Marchantiaceae, Hepaticae). *Annales Botanici Fennici* 28(4): 277–301.
- Bischler-Causse H (1989) *Marchantia* L. The Asiatic and Oceanic taxa. *Bryophytorum Bibliotheca* 38: 1–317.
- Blockeel TL, Bastos CJP, Bednarek-Ochyra H, Ochyra R, Dulin MV, Fovet L, García C, Hedenäs L, Hugonnot V, Kirmaci M, Koponen T, Lebouvier M, Martins A, Müller F, Sabovljević M, Lakušić D, Schäfer-Verwimp A, Sérgio C, Surina B, Yayintaş ÖT (2009) New national and regional bryophyte records, 22. *Journal of Bryology* 31(3): 202–210. <https://doi.org/10.1179/037366809X12469790518367>

- Bonner CEB (1962) Index hepaticarum. Pars II. *Achiton* to *Balantiopsis*. J. Cramer, Weinheim, 320 pp.
- Bonner CEB (1963) Index hepaticarum. Pars III. *Barbilophozia* to *Ceranthus*. J. Cramer, Weinheim, 636 pp.
- Bonner CEB (1965) Index Hepaticarum. Pars V. *Delavayella* to *Geothallus*. J. Cramer, Weinheim, 480 pp.
- Carl H (1931) Die Arttypen und die systematische Gliederung der Gattung *Plagiochila* Dum. Annales Bryologici (suppl. 2): 1–170.
- Coxson D (1992) Nutrient release from epiphytic bryophytes in tropical montane rain forest. Canadian Journal of Botany 69(10): 2122–2129. <https://doi.org/10.1139/b91-266>
- Cremer KW, Mount AB (1965) Early stages of plant succession following the complete felling and burning of *Eucalyptus regnans* forest in the Florentine Valley, Tasmania. Australian Journal of Botany 13: 303–322. <https://doi.org/10.1071/BT9650303>
- Czumaj A, Dong S, Scheben A, Schäfer-Verwimp A, Feldberg K, Heinrichs J (2013) Transfer of *Lejeunea huctumalcensis* to *Physantholejeunea* (Lejeuneaceae, Porellales). Australian Systematic Botany 26(5): 386–392. <https://doi.org/10.1071/SB13039>
- De Lucia EH, Turnbull MH, Walcroft AS, Griffen KL, Tissue DT, Glenn D, McSeventy TM, Whitehead D (2003) The contribution of bryophytes to the carbon exchange for a temperate rainforest. Global Change Biology 9(8): 1158–1170. <https://doi.org/10.1046/j.1365-2486.2003.00650.x>
- Dong S, Schäfer-Verwimp A, Pócs T, Feldberg K, Czumaj A, Schmidt AR, Schneider H, Heinrichs J (2013) Size doesn't matter – recircumscription of *Microlejeunea* (Lejeuneaceae, Porellales) based on molecular and morphological evidence. Phytotaxa 85(2): 41–55. <https://doi.org/10.11646/phytotaxa.85.2.2>
- Easa PS (2003) Biodiversity documentation for Kerala, part 4 Bryophytes. Kerala Forest Research Handbook 17: 1–47.
- Eggers J, Frahm J-P, Pursell RA (1998) New bryophyte taxon records for tropical countries II. Tropical Bryology 14: 81–84. <https://doi.org/10.11646/bde.14.1.12>
- Engel JJ, Smith Merrill GL (2019) Bonner's "Types" are not lectotypes. Nova Hedwigia 109(1/2): 63–64. https://doi.org/10.1127/nova_hedwigia/2019/0545
- Enroth J (1991) On the phytogeography of Western Melanesian Hepaticae. A literature review. The Journal of the Hattori Botanical Laboratory 70: 1–42.
- Forrest LL, Davis EC, Long DG, Crandall-Stotler BJ, Clark A, Hollingsworth ML (2006) Unravelling the evolutionary history of the liverworts (Marchantiophyta): Multiple taxa, genomes and analyses. The Bryologist 109(3): 303–334. [https://doi.org/10.1639/0007-2745\(2006\)109\[303:UTEHOT\]2.0.CO;2](https://doi.org/10.1639/0007-2745(2006)109[303:UTEHOT]2.0.CO;2)
- Frahm J-P (1990) Bryophyte phytomass in tropical ecosystems. Botanical Journal of the Linnean Society 104(1–3): 23–33. <https://doi.org/10.1111/j.1095-8339.1990.tb02209.x>
- Geissler P, Bischler H (1985) Index hepaticarum vol. 10. *Lembidium* to *Mytilopsis*. J. Cramer, Berlin, 352 pp.
- Ginting N, Batubara MS (2019) The diversity of liverworts in the Dolok Sordang Sub-District of Sipirok, South Tapanuli, Indonesia. Budapest international research in exact sciences 1(2): 55–64. <https://doi.org/10.33258/birex.v1i2.226>

- Girmansyah D, Santika Y, Retnowati A, Wardani W, Haerida I, Widjaja EA, van Balgooy MMJ [Eds] (2013) Flora of Bali: an Annotated Checklist. Bogor: Herbarium Bogoriense, Botany Division, Research Center for Biology-LIPI & Yayasan Pustaka Obor Indonesia.
- Gradstein SR (1975) A taxonomic monograph of the genus *Acrolejeunea* (Hepaticae), with an arrangement of the genera of Ptychanthoideae. *Bryophytorum Bibliotheca* 4: 1–162.
- Gradstein R, Culmsee H (2010) Bryophyte diversity on tree trunks in montane forests of Central Sulawesi Indonesia. *Tropical Bryology* 31: 95–105. <https://doi.org/10.11646/bde.31.1.16>
- Gradstein SR, Churchill SP, Salazar-Allen N (2001) Guide to the Bryophytes of Tropical America. The New York Botanical Garden Press, New York.
- Gradstein SR, Wilson R, Ilkiu-Borges AL, Heinrichs J (2006) Phylogenetic relationships and neotenic evolution of *Metzgeriopsis* (Lejeuneaceae) based on chloroplast DNA. *Botanical Journal of the Linnean Society* 151(3): 293–308. <https://doi.org/10.1111/j.1095-8339.2006.00531.x>
- Grolle R (1966) Die Lebermoose Nepals. Khumbu Himal. Ergebnisse des Forschungsunternehmens Nepal Himalaya 1(4): 262–298. https://doi.org/10.1007/978-3-642-92914-4_5
- Grolle R (1968) *Gottschelia* – eine neue Jungermanniales-Gattung der Paläotropis. *The Journal of the Hattori Botanical Laboratory* 31: 13–19.
- Grolle R, So ML (1999a) Studies of *Plagiochila* sect. *Subtropicae* in Asia. *The Bryologist* 102(1): 67–75. <https://doi.org/10.2307/3244462>
- Grolle R, So ML (1999b) Studies on *Plagiochila* sect. *Tayloriae* in Asia. *The Bryologist* 102(2): 287–293. <https://doi.org/10.2307/3244366>
- Groth H, Heinrichs J (2005) Maximum likelihood analyses of chloroplast gene *rbcL* sequences indicate relationships of *Syzygiella* (Jungermanniopsida) with Lophoziaceae rather than Plagiochilaceae. *Cryptogamie. Bryologie* 26(1): 49–57.
- Haerida I (2009) Keanekaragaman suku Lejeuneaceae (Hepaticae, Lumut Hati) di daerah sekitar PPKAB (Pusat Pendidikan dan Konservasi Alam Bodogol) Taman Nasional Gunung Gede-Pangrango, Jawa Barat [Diversity of Lejeuneaceae from surrounding area of Bodogol Education Center and Conservation, Gunung Gede-Pangrango National Park]. *Berita biologi* 9(4): 683–691.
- Haerida I (2015) The genus *Frullania* (Hepaticae: Frullaniaceae) in Bali. *Floribunda* 5(2): 71–73. <https://doi.org/10.32556/floribunda.v5i2.2015.131>
- Haerida I (2017) Liverworts of Bali, Indonesia, with new records to the island. *Gardens' Bulletin (Singapore)* 69(1): 81–87. [https://doi.org/10.26492/gbs69\(1\).2017-05](https://doi.org/10.26492/gbs69(1).2017-05)
- Haerida I, Gradstein SR, Tjitrosoedirdjo SS (2010) Lejeuneaceae subfamily Ptychanthoideae (Hepaticae) in West Java. *Gardens' Bulletin (Singapore)* 62(1): 59–111.
- Haerida I, Retnowati A, Djarwaningsih T, Suharna N, Ismail J (2015) Inventarisasi Keanekaragaman dan Potensi Flora, Jamur dan Lumut di Bali. Lembaga Ilmu Pengetahuan Indonesia (LIPI), Jakarta, 17 pp.
- Haerida I, Rosalina D, Robiah Y (2020) Short notes on liverworts of Sumba, Lesser Sunda Islands, Indonesia. *Hikobia* 18: 97–98.
- Hattori S (1951) On a small collection of Hepaticae from Dutch New Guinea. *Botanical Magazine Tokyo* 64(755/756): 112–119. <https://doi.org/10.15281/jplantres1887.64.112>

- Hattori S (1966) Anthocerotae and Hepaticae. In: Hara H (Ed.) The flora of Eastern Himalaya. Results of the botanical expedition to eastern Himalaya organized by the University of Tokyo 1960 and 1963. Univ. Tokyo Pr., Tokyo, 501–536.
- Hattori S (1969) Studies of the Asiatic species of the genus *Porella* (Hepaticae). II. The Journal of the Hattori Botanical Laboratory 32: 319–359.
- Hattori S (1975) Notes on the Asiatic species of the genus *Frullania*, Hepaticae. VII. The Journal of the Hattori Botanical Laboratory 39: 277–313.
- Hattori S (1976) Studies of the Asiatic species of the genus *Porella* (Hepaticae). VI. The Journal of the Hattori Botanical Laboratory 40: 121–138.
- Hattori S (1980) A revision of the subgenus *Homotropantha* of the genus *Frullania*, Hepaticae. The Journal of the Hattori Botanical Laboratory 47: 165–236.
- Hattori S (1986) A synopsis of New Caledonian Frullaniaceae. The Journal of the Hattori Botanical Laboratory 60: 203–237.
- Hegewald E, van Zanten BO (1986) A list of bryophytes from Bali (Indonesia) collected by E. and P. Hegewald in 1981. The Journal of the Hattori Botanical Laboratory 60: 263–269.
- Heinrichs J, Dong S, Feldberg K, Schäfer-Verwimp A, Schmidt AR (2012) *Sphaerolejeunea* (Lejeuneaceae, Porellales) is a synonym of *Lejeunea*. Phytotaxa 69(1): 7–15. <https://doi.org/10.11646/phytotaxa.69.1.3>
- Heinrichs J, Dong S, Schäfer-Verwimp A, Peralta DF, Feldberg K, Schmidt AR, Schneider H (2014a) Towards a monophyletic classification of Lejeuneaceae II: Subtribes Pycnolejeuneinae and Xylolejeuneinae subtr. nov, transfer of *Otolejeunea* to Lepidolejeuneinae, and generic refinements. Phytotaxa 163(2): 61–76. <https://doi.org/10.11646/phytotaxa.163.2.1>
- Heinrichs J, Schäfer-Verwimp A, Czumay A, Dong S, Scheben A, Feldberg K, Schneider H (2014b) Towards a monophyletic classification of Lejeuneaceae I: Subtribe Leptolejeuneinae subtr. nov. Phytotaxa 156(3): 165–174. <https://doi.org/10.11646/phytotaxa.156.3.7>
- Herzog T (1934) Studien über *Drepanolejeunea* II. Annales Bryologici 7: 57–94.
- Inoue H (1984) The genus *Plagiochila* (Dum.) Dum. in southeast Asia. Academia Scientific Books, Tokyo, 142 pp.
- Inoue H (1989) The bryophytes of Sabah (north Borneo) with special reference to the BRYOTROP transect of Mount Kinabalu V. *Plagiochila* (Plagiochilaceae, Hepaticae). Willdenowia 18(2): 555–567.
- Jepson P, Whittaker RJ (2002) Ecoregions in context: A critique with special reference to Indonesia. Conservation Biology 16(1): 42–57. <https://doi.org/10.1046/j.1523-1739.2002.01143.x>
- Jovet-Ast S (1967) Compléments à l'étude des *Colura*: Localités nouvelles; description d'une espèce nouvelle de Borneo. Revue Bryologique et Lichénologique 35(1/4): 143–148.
- Jovet-Ast S (2000) Documents pour la connaissance des *Riccia* australiens (Hépatiques, Marchantiales) – nouvelles récoltes. Taxons nouveaux. Commentaires morphologiques et écologiques. Cryptogamie. Bryologie 21(4): 289–343. [https://doi.org/10.1016/S1290-0796\(00\)01042-7](https://doi.org/10.1016/S1290-0796(00)01042-7)
- Jovet-Ast S (2003) *Riccia* des sous-genres *Riccia* et *Ricciella* récoltées en Indie et en Indonésie. Cryptogamie. Bryologie 24(3): 209–228.

- Jovet-Ast S, Schmid M (1958) Bryophytes du Haut-Donaï et du Darlac (Viet-Nam). *Revue Bryologique et Lichénologique* 27(3/4): 195–200.
- Juslén A (2006) Revision of Asian *Herbertus* (Herbertaceae, Marchantiophyta). *Annales Botanici Fennici* 43(6): 409–436.
- Kamimura M (1975) A small collection of liverworts from Java and Borneo II. *Bulletin of Kochi Gakuen Junior College* 6: 5–15.
- Kitagawa N (1981) Miscellaneous notes on little-known species of Hepaticae, 51–70. *Hikobia* (suppl. 1): 67–72.
- Krayesky DM, Crandall-Stotler BJ, Stotler RE (2005) A revision of the genus *Fossombronia* Raddi in the east Asia and Oceania. *The Journal of the Hattori Botanical Laboratory* 98: 1–45.
- Kusuma AJ (2017) Pengaruh Norma HAM Terhadap Proses Kemerdekaan Timor Leste dari Indonesia. *Otoritas. Jurnal Ilmu Pemerintahan* 7(1): 1–13. <https://doi.org/10.26618/ojip.v7i1.420>
- Ligrone R, Duckett JG, Renzaglia KS (2012) Major transitions in the evolution of early land plants: A bryological perspective. *Annals of Botany* 109(5): 851–871. <https://doi.org/10.1093/aob/mcs017>
- Long DG (2006) Revision of the genus *Asterella* P. Beauv. in Eurasia. *Bryophytorum Bibliotheca* 63: 1–299.
- Long DG, Grolle R (1990) Hepaticae of Bhutan II. *The Journal of the Hattori Botanical Laboratory* 68: 381–440.
- McNeill J (2014) Holotype specimens and type citations: General issues. *Taxon* 63(5): 1112–1113. <https://doi.org/10.12705/635.7>
- Miller HA (1968) Hepaticae from Truk, Caroline Islands. *Micronesica* 4: 239–254.
- Miller HA, Whittier HO, Whittier BA (1983) Prodrum florae hepaticarum Polynesiae. *Catalogue of Hepaticae and Anthocerotae. Bryophytorum Bibliotheca* 25: 1–423.
- Mitten W (1885) The Southeastern Moluccas. Musci et Hepaticae. In: Hemsley W (Ed.) Report on the Scientific Results of the voyage of H. M. S. Challenger. Botany. Vol. 1. III. part 2. Taylor et A.D. Poyser Limited, London, 212–214.
- Mizutani M (1967) Studies of the Himalayan species of *Bazzania*. *The Journal of the Hattori Botanical Laboratory* 30: 71–90.
- Monk KA, De Freter V, Reksodihardjo LG (1997) The ecology of Nusa Tenggara and Maluku (The ecology of Indonesia Series Volume V). Periplus Edition, Singapore.
- Patzak SDF, Renner MAM, Schäfer-Verwimp A, Feldberg K, Heslewood MM, Fernandez Peralta D, Matos de Souza A, Schneider H (2016) A phylogeny of Lophocoleaceae-Plagiochilaceae-Brevianthaceae and a revised classification of Plagiochilaceae. *Organisms, Diversity & Evolution* 16(3): 481–495. <https://doi.org/10.1007/s13127-015-0258-y>
- Piippo S (1985) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XII. Geocalycaceae (Hepaticae). *Acta Botanica Fennica* 131: 129–167.
- Piippo S (1989a) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXX. Plagiochilaceae (Hepaticae). *Annales Botanici Fennici* 26(2): 183–236.
- Piippo S (1989b) The bryophytes of Sabah (North Borneo) with special reference to the BRYO-TROP transect of Mount Kinabalu. III. Geocalycaceae. *Willdenowia* 18(2): 513–527.
- Piippo S (1993) On the taxonomy and nomenclature of SW Asiatic Geocalycaceae (Hepaticae). *Annales Botanici Fennici* 30(3): 195–203.

- Piippo S, Tan BC (1992) Novelties for the Philippine hepatic flora. *The Journal of the Hattori Botanical Laboratory* 72: 117–126.
- Pócs T (1971) [An investigation of the mountain bryoflora of the Hashang province (Democratic Republic of Vietnam). Hepaticae]. *Botanicheskii Zhurnal* 56(5): 670–677.
- Pócs T (1980) The epiphytic biomass and its effect on the water balance of two rain forest types in the Uluguru Mountains (Tanzania, East Africa). *Acta Botanica Academiae Scientiarum Hungaricae*, Budapest 26: 143–167.
- Pócs T, Chantanaorrapint S (2016) Southern Thailand Bryophytes III: A preliminary study on non-epiphyllous taxa in lowland areas. *Songklanakarin Journal of Science and Technology* 38(3): 311–318.
- Pócs T, Tixier P, Jovet-Ast S (1967) Seconde contribution à la bryoflore du Nord Vietnam. *Botanikai Közlemények* 54(1): 27–38. [Adatok Észak-Vietnám mohafldrájához. II]
- Pócs T, Sass-Gyarmati A, Naikatini A, Tuiwawa M, Braggins JE, Pócs S, von Konrat MJ (2011) New liverwort (Marchantiophyta) records for the Fiji Islands. *Telopea* 13(3): 455–494. <https://doi.org/10.7751/telopea20116031>
- Reilly SB (2016) Historical Biogeography of Reptiles and Amphibians from the Lesser Sunda Islands of Indonesia. University of California, Berkeley, ProQuest Dissertations Publishing. [10251004]
- Renner MAM (2021) The typification of Australasian *Plagiochila* species (Plagiochilaceae: Jungermanniidae): a review with recommendations. *New Zealand Journal of Botany*: 1–53. <https://doi.org/10.1080/0028825X.2020.1859557>
- Renner MAM, Heslewood MM, Patzak SD, Schäfer-Verwimp A, Heinrichs J (2016) The genera *Chiastocaulon*, *Cryptoplagiochila* and *Pedinophyllum* (Plagiochilaceae) in Australia. *Australian Systematic Botany* 29(4/5): 358–402. <https://doi.org/10.1071/SB16029>
- Renner MAM, Patzak SDF, Heslewood MM, Schäfer-Verwimp A, Heinrichs J (2017) Third time lucky? Another substantially revised sectional classification for Australasian *Plagiochila* (Plagiochilaceae. *Australian Systematic Botany* 30(1): 70–104. <https://doi.org/10.1071/SB16038>
- Retnowati A, Rugayah JSR, Arifiani D (2019) Status Keanekaragaman Hayati Indonesia: Kekayaan Jenis Tumbuhan dan Jamur Indonesia. LIPI Press, Jakarta, 139 pp.
- Rosyanti, Afriyansyah B, Haerida I (2018) Keanekaragaman Lumut di Kebun Botani Bangka Flora Society, Bangka. *Floribunda* 5(8): 315–321. [Diversity of bryophytes from botanical garden of Bangka Flora Society, Bangka]
- Sande Lacoste CM (1856) Synopsis hepaticarum javanicarum. C. G. van der Post, Amsterdam, 112 pp.
- Sande Lacoste CM (1864) Hepaticae. *Jungermanniae archipelagi indici*. *Annales Musei Botanici Lugduno-Batavi* 1: 287–314.
- Schäfer-Verwimp A (2006) A new species of *Diplasiolejeunea* (Lejeuneaceae, Jungermanniopsida) from Sumatra, and a key for the genus in Asia. *Herzogia* 19: 239–244.
- Schäfer-Verwimp A (2009) New national and regional bryophyte records, 22. *Journal of Bryology* 31(3): 201–210. <https://doi.org/10.1179/037366809X12469790518367>
- Schäfer-Verwimp A, Feldberg K, Dong S, van Melick H, Peralta DF, Schmidt AR, Schneider H, Heinrichs J (2014) Towards a monophyletic classification of Lejeuneaceae III: The sys-

- tematic position of *Leiolejeunea*. Phytotaxa 170(3): 187–198. <https://doi.org/10.11646/phytotaxa.170.3.4>
- Schiffner V (1898) Conspectus hepaticarum archipelagi indici. Staatsdruckerei, Batavia, 382 pp.
- Schiffner V (1900) Die Hepaticae der Flora von Buitenzorg. I. Band. E. J. Brill, Leiden, 220 pp.
- Schiffner V (1955) Die Lebermoose der Deutschen Limnologischen Sunda-Expedition. Archiv für Hydrobiologie (suppl. 21)(3/4): 382–407.
- Sharma D, Srivastava SC (1993) Indian Lepidoziinae (a taxonomic revision). Bryophytorum Bibliotheca 47: 1–353.
- Shu L, Zhu R-L (2019) *Leptolejeunea nigra* (Lejeuneaceae), a new species with brownish black ocelli based upon morphology and DNA. Phytotaxa 427(1): 31–42. <https://doi.org/10.11646/phytotaxa.427.1.4>
- Siregar ES (2015) The liverworts (Marchantiophyta) of Mount Sibayak North Sumatra [Lumut hati (Marchantiophyta) di Gunung Sibayak Sumatra Utara]. Bogor Agricultural University, Bogor, Java, 105 pp. <http://repository.ipb.ac.id/handle/123456789/77268>
- Siregar ES, Pasaribu N (2020) The liverwort family Lejeuneaceae (Marchantiophyta) of Mount Lubuk Raya, North Sumatra, Indonesia. Biodiversitas (Surakarta) 21(6): 2767–2776. <https://doi.org/10.13057/biodiv/d210653>
- Siregar ES, Ariyanti NS, Tjitrosoedirdjo SS (2013) The liverwort genus *Marchantia* (Marchantiaceae) of Mount Sibayak, North Sumatra, Indonesia. Biotropia 20(2): 73–80. <https://doi.org/10.11598/btb.2013.20.2.327>
- Siregar ES, Ariyanti NS, Tjitrosoedirdjo SS (2014) Lejeuneaceae anak suku Ptychanthoideae di Hutan Sibayak, Sumatra Utara. Floribunda 4(8): 218–225. [Lejeuneaceae subfamily Ptychanthoideae in Sibayak Forest, North Sumatra] <https://doi.org/10.32556/floribunda.v4i8.2014.118>
- Siregar ES, Hannum S, Pasaribu N (2017) Lejeuneaceae (Marchantiophyta) of Sicike-cike Natural Park, North Sumatra Indonesia. Taiwaniana 62(4): 356–362. <https://doi.org/10.6165/tai.2017.62.356>
- Siregar ES, Ariyanti NS, Tjitrosoedirdjo SS (2018) *Plagiochila* (Marchantiophyta) of Mount Sibayak, North Sumatra. IOP Conference Series: Earth and Environmental Science 130 (012017): 1–11. <https://doi.org/10.1088/1755-1315/130/1/012017>
- So ML (2001) *Plagiochila* (Hepaticae, Plagiochilaceae) in China. Monographs in Systematic Botany 60: 1–214. <https://doi.org/10.2307/25027887>
- So ML (2003a) The genus *Schistochila* in Asia. The Journal of the Hattori Botanical Laboratory 93: 79–100.
- So ML (2003b) The genus *Metzgeria* (Hepaticae) in Asia. The Journal of the Hattori Botanical Laboratory 94: 159–177.
- So ML, Grolle R (1999) Studies on *Plagiochila* in Asia: Supplements to sections *Abietinae*, *Annotinae*, *Ciliatae*, *Contiguae*, *Cucullatae*, *Poeltiae*, *Subtropicae* and *Zonatae*. Cryptogamie. Bryologie 20(3): 167–179. [https://doi.org/10.1016/S1290-0796\(99\)80014-5](https://doi.org/10.1016/S1290-0796(99)80014-5)
- Söderström L, Séneca A (2008) Can species richness and richness of range restricted species be used as Tool for Conservation. In: Mohamed H, Baki BB, Nasrulhaq-Boye A, Lee PKY (Eds) Bryology in the New Millennium, 439–450.
- Söderström L, Gradstein SR, Hagborg A (2010) Checklist of the hornworts and liverworts of Java. Phytotaxa 9: 53–149. <https://doi.org/10.11646/phytotaxa.9.1.7>

- Söderström L, Hagborg A, von Konrat M, Renner MAM (2008) Chapter Ten: Early Land Plants Today: Liverwort checklist of checklists. *Fieldiana Botany* 47: 105–130. <https://doi.org/10.3158/0015-0746-47.1.105>
- Söderström L, Hagborg A, von Konrat M, Bartholomew-Began S, Bell D, Briscoe L, Brown E, Cargill DC, Costa DP, Crandall-Stotler BJ, Cooper E, Dauphin G, Engel J, Feldberg K, Glenny D, Gradstein SR, He X, Hentschel J, Ilkiu-Borges AL, Katagiri T, Konstantinova NA, Larraín J, Long D, Nebel M, Pócs T, Puche F, Reiner-Drehwald E, Renner M, Sass-Gyarmati A, Schäfer-Verwimp A, Segarra-Moragues J, Stotler RE, Sukkharak P, Thiers B, Uribe J, Váňa J, Wigginton M, Zhang L, Zhu R-L (2016) World checklist of hornworts and liverworts. *PhytoKeys* 59: 1–828. <https://doi.org/10.3897/phytokeys.59.6261>
- Srivastava SC, Sharma D (2000) A preliminary study on the liverwort and hornwort flora of Silent Valley (Kerala). In: Chauhan DK (Ed.) Prof. D.D. Nautiyal Commemoration Volume: Recent Trends in Botanical Researches. University of Allahabad, Allahabad, 55–75.
- Srivastava A, Srivastava SC (2002) Indian Geocalycaceae (Hepaticae). A taxonomic study. Bishen Singh Mahendra Pal Singh, Dehra Dun, 246 pp.
- Stephani F (1886) Hepaticarum species novae vel minus cognitae VIII. *Hedwigia* 25(6): 233–249.
- Stephani F (1899) Species hepaticarum 1. *Bulletin de l'Herbier Boissier* 7(7): 518–533. <https://doi.org/10.5962/bhl.title.95494>
- Stephani F (1907) Species hepaticarum 3. *Bulletin de l'Herbier Boissier (sér. 2)* 7(10): 837–852. <https://doi.org/10.5962/bhl.title.95494>
- Stephani F (1908) Species hepaticarum 3. *Bulletin de l'Herbier Boissier (sér. 2)* 8(10): 745–776. <https://doi.org/10.5962/bhl.title.95494>
- Stephani F (1909) Species hepaticarum 3. George & Cie, Genève & Bale, 517–693. <https://doi.org/10.5962/bhl.title.95494>
- Stephani F (1911) Species hepaticarum 4. George & Cie, Genève & Bale, 449–736. <https://doi.org/10.5962/bhl.title.95494>
- Stephani F (1917) Species hepaticarum 6. George & Cie, Genève & Bale, 1–128. <https://doi.org/10.5962/bhl.title.95494>
- Stephani F (1924) Species hepaticarum 6. George & Cie, Genève & Bale, 433–622.
- Sukkharak P (2011) Taxonomy and phylogeny of the liverwort genus *Thysananthus* (Marchantiophyta: Lejeuneaceae). Georg-August Universität, Göttingen, 189 pp.
- Sukkharak P (2015) A systematic monograph of the genus *Thysananthus* (Lejeuneaceae, Marchantiophyta). *Phytotaxa* 193(1): 1–81. <https://doi.org/10.11646/phytotaxa.193.1.1>
- Sukkharak P, Gradstein SR (2014) A taxonomic revision of the genus *Mastigolejeunea* (Marchantiophyta: Lejeuneaceae). *Nova Hedwigia* 99(3/4): 279–345. <https://doi.org/10.1127/0029-5035/2014/0206>
- Swanson ES, Miller HA (1969) Hepaticae from Palau, Caroline Islands, II. Enumeration. *Micronesica* 5: 139–149.
- Thiers BM (1993) A monograph of *Pleurozia* (Hepaticae, Pleuroziaceae). *The Bryologist* 96(4): 517–554. <https://doi.org/10.2307/3243984>
- Tixier P (1962) Bryophytes du Vietnam. Premières récoltes dans le massif de Bach-Ma. *Revue Bryologique et Lichénologique* 31(3/4): 190–203.

- Tixier P (1973) Bryophytae Indosinicae. Liverworts collected in Thailand. Natural History Bulletin of the Siam Society 24(3/4): 449–456.
- Tixier P (1974) Bryophytes exotiques: Bryophytes des Nouvelle-Hebrides (Expedition de la Royal Society). Bulletin du Muséum National d'Histoire Naturelle (sér. 3). Botanique 16(269): 33–45.
- Tixier P (1979) Bryogéographie du Mont Bokor (Cambodge) (Bryophyta indosinica XXIV). Bryophytorum Bibliotheca 18: 5–121.
- Touw A (1992) A Survey of The Mosses of the Lesser Sunda Islands (Nusa Tenggara), Indonesia. The Journal of the Hattori Botanical Laboratory 71: 289–366.
- van Steenis-Kruseman MJ, van Steenis CGGJ (1950) Malaysian plant collectors and collections being a Cyclopaedia of botanical exploration in Malaysia and a guide to the concerned literature up to the year 1950. Flora Malesiana – Series 1. Spermatophyta 1(1): 2–639.
- van Welzen PC, Slik JWF, Alahuhta J (2005) Plant distribution patterns and plate tectonics in Malesia. In: Friis I, Balslev H (Eds) Proceedings of a symposium on plant diversity and complexity patterns: local, regional and global dimensions. Biologiske Skrifter, The Royal Danish Academy of Sciences and Letters, Copenhagen, 199–217.
- Váňa J (1972) Miscellaneous notes on the Asiatic Jungermannioideae II. Journal of the Hattori Botanical Laboratory 36: 57–74.
- Váňa J (1973) Lebermoose aus Neuguinea. 10. *Jungermannia*. The Journal of the Hattori Botanical Laboratory 37: 185–190.
- Váňa J (1975) Studien über die Jungermannioideae (Hepaticae). 8. *Jungermannia* subg. *Plectocolea* und *Solenostoma* in Australien, Neuseeland und Ozeanien. Folia Geobotanica et Phytotaxonomica 10(3): 277–323. <https://doi.org/10.1007/BF02854717>
- Váňa J (1991a) The bryophytes of Sabah (north Borneo) with special reference to the BRYO-TROP transect of Mt. Kinabalu. XIII. Jungermanniaceae (Hepaticopsida, Jungermanniales). Willdenowia 20: 171–183.
- Váňa J (1991b) The bryophytes of Sabah (North Borneo) with special reference to the BRYO-TROP transect of Mt. Kinabalu. XV. Lophoziaceae. Willdenowia 20: 199–219.
- Váňa J, Piippo S (1989a) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXIX. Jungermanniaceae and Gymnomitriaceae (Hepaticae). Annales Botanici Fennici 26(2): 107–125.
- Váňa J, Piippo S (1989b) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXXI. Cephaloziaceae subfam. Alobielloideae, Cephaloziellaceae, Antheliaceae and Lophoziaceae (Hepaticae). Annales Botanici Fennici 26(3): 263–290.
- Váňa J, Ochyra R, Lebouvier M, Cykowska-Marzencka B (2014) Bryophytes of Île Amsterdam in the South Indian Ocean: 1. Liverworts. Cryptogamie. Bryologie 35(4): 335–371. <https://doi.org/10.7872/cryb.v35.iss4.2014.335>
- Verdoorn F (1930) Die Frullaniaceae der Indomalaischen Inseln (De Frullaniaceis VII). Annales Bryologici (suppl. 1): 1–187. <https://doi.org/10.1007/978-94-015-5385-8>
- Verdoorn F (1934a) De Frullaniaceis XV. Die Lejeuneaceae Holostipae der Indomalaya unter Berücksichtigung sämtlicher aus Asien, Australien, Neuseeland und Ozeanien angeführten Arten. Annales Bryologici (suppl. 4): 40–192. https://doi.org/10.1007/978-94-015-5442-8_2

- Verdoorn F (1934b) De Frullaniaceis XVII. Über neue *Frullania*-Sammlungen und die Verbreitung der Jubuleae. *Annales Bryologici* (suppl. 4): 203–224. https://doi.org/10.1007/978-94-015-5442-8_4
- Verdoorn F (1935) Hepaticae selectae et criticae, series VII (1934) et series VIII (1935) and Musci selecti et critici, series I (1934) et series II (1935). *Annales Bryologici* 8: 150–158.
- Verdoorn F (1937) On some new collections of Asiatic and Oceanic *Jubulae* (De Frullaniaceis XVIII). *Blumea* (suppl. 1): 210–213.
- von Konrat M, Söderström L, Hagborg A (2010) The Early Land Plants Today project: A community-driven effort and a new partnership with Phytotaxa. *Phytotaxa* 9(1): 11–21. <https://doi.org/10.11646/phytotaxa.9.1.4>
- Wilson R, Gradstein SR, Schneider H, Heinrichs J (2007) Unravelling the phylogeny of Lejeuneaceae (Jungermanniopsida): Evidence for four main lineages. *Molecular Phylogenetics and Evolution* 43(1): 270–282. <https://doi.org/10.1016/j.ympev.2006.10.017>
- Wilson R, Gradstein SR, Heinrichs J, Groth H, Ilkiu-Borges AL, Hartmann FA (2004) Phylogeny of Lejeuneaceae: a cladistic analysis of chloroplast gene *rbcL* sequences and morphology with preliminary comments on the mitochondrial NAD4-2 spacer region. *Monographs in Systematic Botany from the Missouri Botanical Garden* 98: 189–202.
- Winter G, Schäfer-Verwimp A (2020) Re-evaluation of the taxonomic status of *Frullania caulisequa* and *Frullania obcordata* (Frullaniaceae, Marchantiophyta). *Frahmia* 19: 1–21.
- Yamada K, Hayashi M (2003) Studies on the bryophyte flora of Vanuatu. 8. *Heteroscyphus* (Geocalycaceae, Hepaticae). *Bulletin of the National Science Museum, Tokyo Series B – Botany* 29: 149–152.
- Ye W, Zhu RL (2018) *Gaolejeunea*, a new genus from China and new member of subtribe Echinolejeuneinae (Lejeuneaceae, Marchantiophyta). *The Bryologist* 121(1): 41–48. <https://doi.org/10.1639/0007-2745-121.1.041>
- Zhang J, Fu XX, Li RQ, Zhao X, Liu Y, Li M-H, Zwaenepoel A, Ma H, Goffinet B, Guan Y-L, Xue J-Y, Liao Y-Y, Wang Q-F, Wang Q-H, Wang J-Y, Zhang G-Q, Wang Z-W, Jia Y, Wang M-Z, Dong S-S, Yang J-F, Jiao Y-N, Guo Y-L, Kong H-Z, Lu A-M, Yang H-M, Zhang S-Z, de Peer YV, Liu Z-J, Chen Z-D (2020) The hornwort genome and early land plant evolution. *Nature Plants* 6(2): 107–118. <https://doi.org/10.1038/s41477-019-0588-4>
- Zhu R-L, Gradstein SR (2005) Monograph of *Lopholejeunea* (Spruce) Schiffn. (Lejeuneaceae, Hepaticae) in Asia. *Monographs in Systematic Botany from the Missouri Botanical Garden* 74: 1–95.
- Zollinger H (1854) Systematisches Verzeichniss der im indischen Archipel in den Jahren 1842–1848 gesammelten sowie der aus Japan empfangenen Pflanzen. 1 Heft, Zürich, Kiesling, 1–80. <https://doi.org/10.5962/bhl.title.53656>